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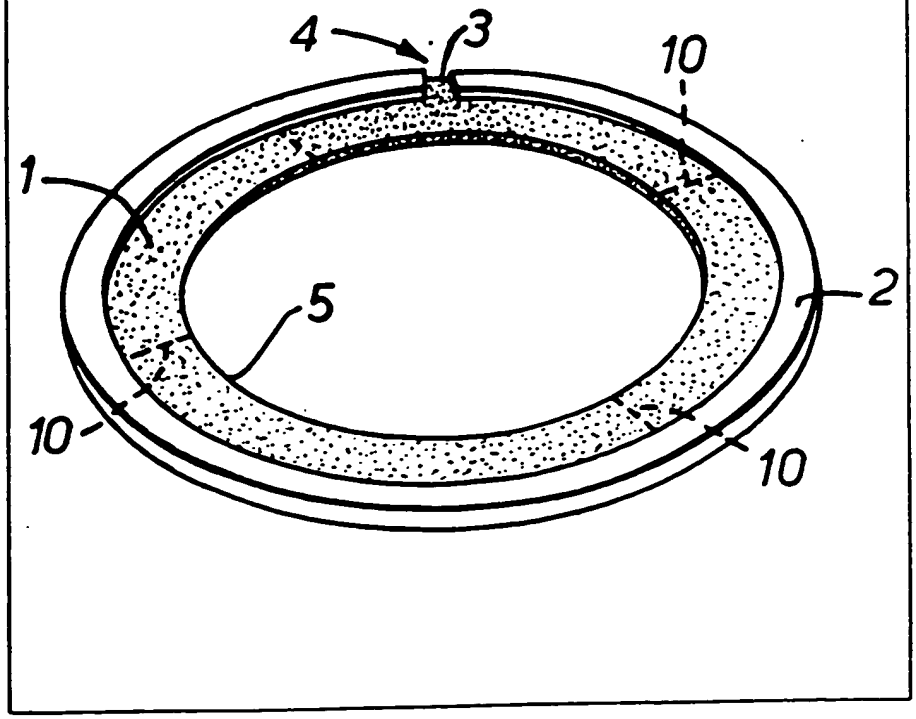
(54) An edge seal ring

(57) An edge seal ring, particularly for the palm of an engine crankshaft, comprises an annular washer (1) of resiliently deformable material, such as a natural or synthetic rubber or PTFE, and a metal reinforcing ring (2) folded and axially clamped about a periph ral margin of the washer, th reinforcing ring being split, such as by a radial gap (4), to permit contraction or expansion of the ring for fitting in place. To allow venting, fine cuts (10) can be made in the washer, or the periphery of the ring (2) may be finely knurled or milled.

FIG. 2



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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

FIG.1

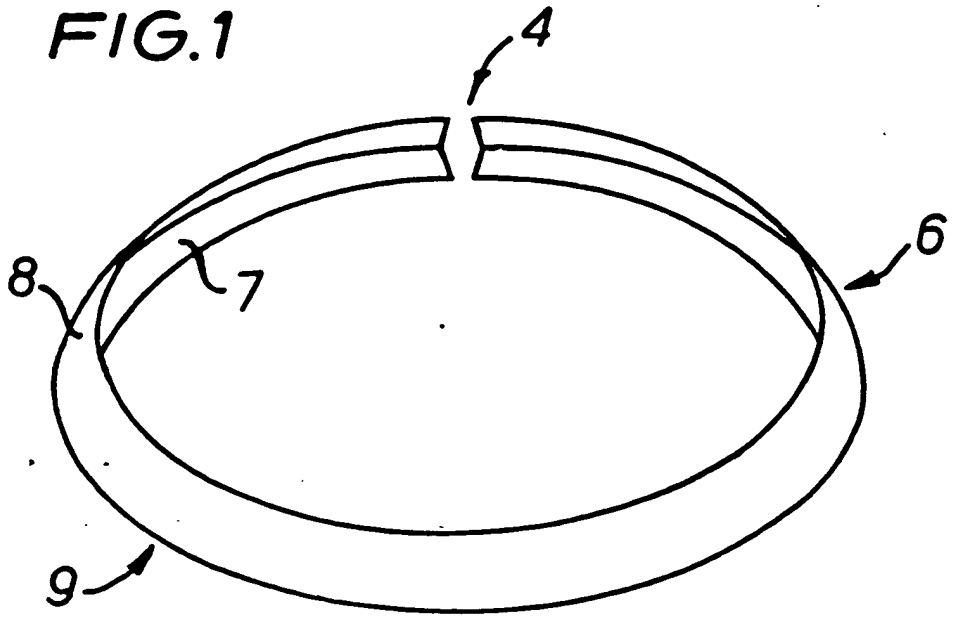
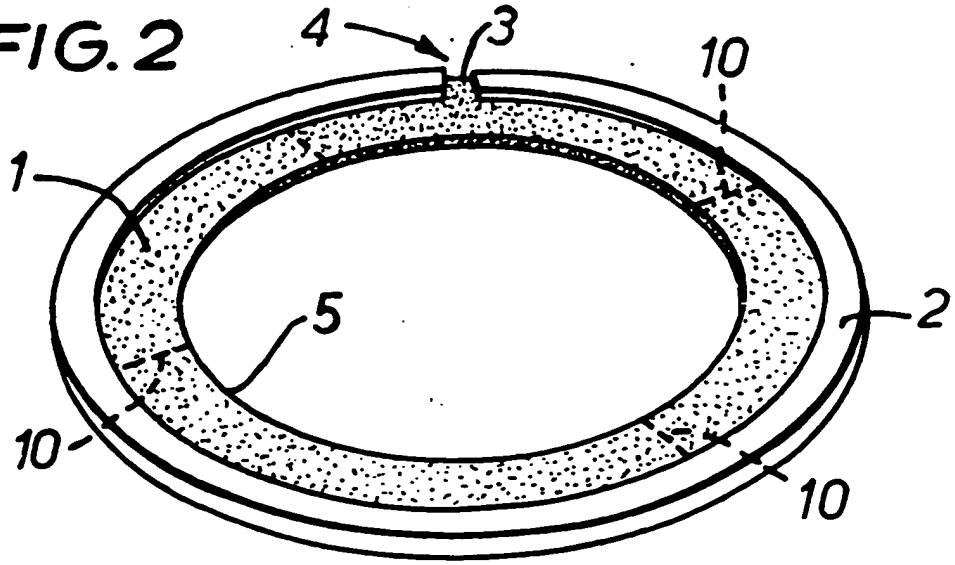


FIG.2



SPECIFICATION

An improved edge seal ring and its manufacture

This invention relates to dge seal rings such as may b used as temporary seals for shafts and th like and which are particularly, but not exclusiv ly, intended to be used as installation seals for the palm of a crankshaft during testing, cleaning, painting or storage of an engine.

By the present invention there is provided an edge seal ring consisting of an annular washer of resiliently deformable material and an external or internal metallic reinforcing split ring respectively folded and axially clamped about the outer or inner periphery of the washer.

In a preferred embodiment, the seal ring is of the internal type, to seal at its inner periphery, and has an external reinforcing ring with a diameter greater than that of a housing into which the seal ring is to be installed and a radial gap of sufficient circumferential length to enable the seal to be contracted during installation.

Also according to the present invention, a method of manufacturing an edge seal ring comprises the steps of rolling a metal strip to have a generally V-shaped or other channelled cross-section, further rolling the V-formed strip into a split ring, assembling the split ring in a jig and embracing a periphery of an annular washer of resiliently deformable elastomeric material and then axially compressing the split ring to permanently deform it to clamp on to the washer. This provides an important structural feature in that not only does the metal ring stabilise the washer but the washer, by clamping engagement of the metal ring thereon, serves also to stabilise the metal ring which, although a split ring, is held in circular shape within limits of diameter according to the size of the gap between its ends and the elastomeric material of the washer in the gap.

In a preferred method, the V-formed strip is further rolled into a helix of which an appropriate length is cut to produce the ring.

In a method of the aforesaid preferred embodiment, the V-formed strip is rolled into a split ring having a diameter greater than that of a housing into which the seal is to be installed and a radial gap of sufficient circumferential length to enable the seal to contract during installation.

The invention is illustrated by way of example by the Drawing, wherein:—

Fig. 1 is a perspective view of a rolled, V-section split ring in accordance with the invention; and

Fig. 2 is a similar view of a completed edge seal ring of the internal type.

As shown by Fig. 2, the edge seal ring consists f a thin, flat annular washer 1 of resiliently deformabl elastomeric material, e.g. of natural or synth tic rubber, with an external metal r inforcing split ring 2 folded and axially clamped about the outer periphery or edge 3 of the washer 1. The split ring 2 is preferably made with an external diameter greater than that of the housing int which it is intended to install the s al. Also the split ring 2 has a radial gap 4 with a circumferential length sufficient to enable the ring to contract to temporarily reduce the seal's overall diameter sufficiently to enable it to be installed in a housing; thereafter th ring will tend to xpand thereby helping to hold the seal in the housing.

The inner periphery or edge of the seal forms a sealing edge 5.

One use of the seal is as an installation seal acting on the periphery of the palm of an engine crankshaft to protect the main crankshaft seal during testing, cleaning, painting, storage etc. of an engine. The seal between the sealing edge 5 and the palm periphery acts to prevent ingress of material to the air side of the main crankshaft seal. In one installation, the crankcase housing for the main crankshaft seal extends as a shroud around the crankshaft palm (which is also known as the flywheel crankshaft flange) and the edge seal ring is installed in a circumferential groove in the shroud housing with the outer side of the seal substantially in the same plane as the outer or end face of the palm. If necessary a liquid sealant can be introduced into the housing to seal the radial gap 4.

The seal ring is manufactured by first rolling a metal strip to have a generally V-shaped cross-section and then further rolling the strip into a helix having an external diameter that is, preferably, greater than that of the housing into which the seal is to be installed. Thereafter a suitable circumferential length is cut off the helix to produce the part-formed ring 6 shown in Fig. 1. As can be seen, the ring 6 has a V-shaped cross-section 7 opening radially inwardly of the ring and the cut length of rolled strip is such as to leave a radial gap 4.

The part-formed ring 6 is then placed in a short cylindrical jig (not shown), of which the internal diameter is also greater than that of the intended housing, with a thin flat annular rubber washer already in place in the V-section channel 7 and the channel sides 8, 9 are then axially pressed towards one another to permanently deform the sides and clamp the washer therebetween.

Although the foregoing description has been for an internal edge seal ring it is clear that the invention could equally well be applied to an external seal with a reinforcing ring clamped about the inner periphery of the washer. In such case the split ring diameter would preferably be less than that of the shaft on which it is intended the seal should be installed.

As an alternative to an elastomeric resiliently deformable material, a thermoplastic resiliently deformable material such as P.T.F.E. could be used.

The opposit ends of the m tal ring may have only a minimum separation or a separation designed to giv a required ext nt of contraction or expansion and the shape of th opposite ends may be d signed so as to present different kinds of junction, for example a scarf junction or an

overlapping junction, pr sented by notched ends, or th nds may be curved. In some circumstances the ends of the metal ring may be held in abutm nt by being clamped onto the wash r, the metal ring being compressed for insertion of the seal into a housing.

In some circumstances it may be desirable to vent the space behind the seal, when fitted to the palm of an engine crankshaft for example, so as to permit the air pressure to balance at either side of the seal but not allow the escape of lubricant or the ingress of moisture or dirt.

For the above purpose, the periphery of the reinforcing ring 2 may be finely knurled or milled to vent the fit of the seal in its housing or fine knife cuts, as indicated by the dotted lines 10 in Fig. 2, may be made in the resiliently deformable washer 1.

CLAIMS

1. An edge seal ring comprising an annular washer of resiliently deformable material and an external or internal reinforcing ring folded and axially clamped about a peripheral margin of the washer, th reinforcing ring being split to permit contraction or expansion thereof for fitting in plac .

2. An edge seal ring according to claim 1, in which the reinforcing ring is a V-section strip of metal rolled into an incomplete ring, having a radial gap, and axially clamped so that the flanges of the V-section grip between them a peripheral margin of the washer.

3. An edge seal ring according to claim 1 or 2, in which the washer or the reinforcing ring has venting means to permit balancing of air pressure at either side of the seal ring when installed.

4. A method of making an edge seal ring according to claim 1, 2 or 3, in which strip metal is rolled into a helix from which there is cut, for each reinforcing ring, a strip long enough to form an almost complete ring which is then clamped on to the washer with a radial gap between opposed ends of the metal ring.

5. An edge seal ring substantially as described and as shown by the accompanying drawing.

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